The History of the U. S. Department of Agriculture, Agricultural Research Service in Nevada

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Until the mid-19th century, agriculture in the western United States was largely extensive production of cattle, sheep, horses and mules. This was certainly true for Nevada where crop production was restricted to areas that could be irrigated. The severe winter of 1889-1890 nearly wiped out the range livestock industry in Nevada and livestock operators recognized they needed irrigated hay production to carry their stock through the winter months.

During the late 1800's, the farming industry in the far western United States tried to convince the Federal Government that it was their responsibility to design, engineer, and provide construction dollars for irrigation projects on arid lands. This was a radical view at the time and took decades before Congress finally passed such legislation.

Among the first of these projects was the Newlands Project on the Truckee and Carson Rivers in western Nevada. The project was named after Senator Newlands, from Nevada, who fought hard to fund these irrigation projects. Initial attempts to grow crops largely failed due to high soil salinity and the presence of phytotoxic elements, such as boron, that are detrimental to crops.

ARS has held numerous field tours for their stakeholders in an effort to build increased cooperation to better apply technology transfer efforts. Here Dr. Young addresses the stakeholders in a field tour in northern Nevada in 1994 concerning the suppression of cheatgrass using long-lived perennial grasses.

In 1913, the U. S. Department of Agriculture (USDA) established a laboratory in Fallon, Nevada to develop a management system for the newly irrigated soils. Drainage to dispose of the salts leached from the soil was just as necessary as the ditches that brought water for irrigation. The USDA laboratory continued to do research until the 1930's, when it became under the control of the College of Agriculture, University of Nevada Reno. The Newlands Irrigation District became famous for the production of very high quality alfalfa hay. Most of the hay was too expensive for range cattle operations and therefore was marketed to the dairy industry in California.

In the 20th century, the Nevada range sheep industry was often referred to as "the poor man's road to success". Domestic sheep wintered on lower elevation salt desert rangelands browsing shrubs, such as winterfat (white sage), and obtained their water by licking snow and frost from the plants. Sheep were able to use vast areas of rangelands where cattle were restricted to the few natural springs and wells for stock water.

The ability of domestic sheep to get their water source from licking snow and frost from plants set the stage for a major disaster in the range sheep industry throughout the Intermountain West. In November of 1942, there were numerous reports of death among domestic sheep bands in Nevada. Dr. C. H. Kennedy, Nevada State Veterinarian, found 160 dead ewes on the Weeks Ranch in Clover Valley. He reported that a "weed was found" in the stomachs of the dead sheep, and sent the plant samples to Dr. C. E. Fleming, Range Scientist, College of Agriculture, University of Nevada Reno.

After a great deal of research, Dr. Fleming identified the weed as Halogeton (*Halogeton glomeratus*) which was later determined to be native to the deserts of Central Asia where it is a relatively rare plant. The toxic compound was determined to be an oxalate, which reduced blood levels of calcium such that tetany occurred.

This plant species changed range research in the Intermountain Area for the next 50 years. Large death tallies of domestic sheep bands caused by Halogeton became headline news in newspapers across the country, even featured in *Life Magazine*.

During World War II the herbicide 2,4-D was developed with the idea of deforesting tropical islands where American marines were having a hard time dislodging Japanese soldiers. It was never used for that purpose, but 2,4-D became the first modern herbicide to be widely used in crop and pasture management in the United States. If properly applied, 2,4-D would kill Halogeton.

The U. S. Department of Interior, Bureau of Land Management (BLM), as well as State agencies treated thousands of acres of Halogeton infested rangelands with 2,4-D applications. Halogeton, an annual, was easily killed, but the next year another crop of Halogeton sprouted from seeds in the soil. To make things even worse, the herbicide also killed native shrubs. The "motto" of range weed control became, "Do not kill the weed unless you can replace it with something better." Congress responded by funding the USDA, Agricultural Research Service (ARS) to establish studies on the control of Halogeton and the establishment of perennial forage plants on affected rangelands.

Dr. W. C. Robocker was assigned by ARS to work in Nevada by the late 1940's. His research involved establishment of a long-lived perennial grass, crested wheatgrass, and successful suppression of Halogeton. Crested wheatgrass cultivars, however, at the time were not adapted to salt affected soils in salt desert shrub environments.

In the late 1950's Dr. Robocker was replaced by Dr. R. A. Evans and Dr. R. E. Eckert and in 1965, range scientist, Dr. J. A. Young joined the team. Together these range scientists worked on a variety of Great Basin rangeland issues; but their biggest challenge was dealing with the highly invasive annual grass cheatgrass.

Cheatgrass truncated secondary succession by outcompeting native perennials for limited moisture. The fine-textured, early maturing fuel also increased the chance, rate, spread, and season of wildfires, which has has plagued Great Basin environments for more than a half century. Dr. R. A. Evans reported that as little as four cheatgrass plants/ft² can out compete most competitive perennial grasses.

Dr. R. E. Eckert reported on the technologies of chemical and mechanical treatments to decrease the cheatgrass seed banks. He additionally studied competition of emerging cheatgrass seedlings to allow perennial grass seedlings their opportunity to become established, and suppress cheatgrass.

Dr. J. A. Young reported on the greater ability of cheatgrass seed to acquire a dormancy, build persistent seed banks, and germinate at a wider range of constant and alternating temperatures more than other desirable plant materials. Dr. J. A. Young also developed the

The Society for Range Management (SRM) is "*the professional society dedicated to supporting persons who work with rangelands and have a commitment to their sustainable use.*" SRM's members are ranchers, land managers, scientists, educators, students, conservationists – a diverse membership guided by a professional code of ethics and unified by a strong land ethic. This series of articles is dedicated to connecting the science of range management with the art, by applied science on the ground in Nevada. Articles are the opinion of the author and may not be an official position of SRM. Further information and a link to submit suggestions or questions are available at the Nevada Section website at http://www.ag.unr.edu/nsrm/. SRM's main webpage is www.rangelands.org. We welcome your comments.

Early research of ARS scientist's helped control the toxic weed Halogeton and replace with more desirable vegetation. Here, is an ARS plot in eastern Nevada were winterfat is being experimented with following Halogeton control.

Another example of ARS field tour in which technology transfer is critical. Here, Dr. R. R. Blank addresses the stakeholders on the soil changes caused by tall whitetop invasions.

concept of the "Stand Renewal Process", which describes that the present plant community is the result of past disturbances or lack of disturbances and that these communities are continually changing.

These ARS scientists collectively discovered and reported on competition among species at the seedling stage, and experimented with a number of herbicides to aid in the control of cheatgrass and the establishment of perennial species.

A Wildland Seed Laboratory was developed to test the germination potential of hundreds of native and exotic species exposed to typical seedbed temperatures of Great Basin seed bank environments. These researchers contributed so extensively to the management of Great Basin rangelands they became one of the leading range research units in the western United States.

Dr. R. A. Evans and Dr. R. E. Eckert retired in 1986, and were replaced by Dr. R. R. Blank, soil scientist, to research the many soil questions limiting Great Basin environments including the effect of wildfire on soil properties. Dr. W. S. Longland, animal ecologist, was hired to research the influence of granivorous rodents on seed and seedbed ecology in Great Basin environments. C. D. Clements was hired shortly thereafter and worked closely with Dr. J. A. Young on the rehabilitation of degraded Great Basin communities, continuing after Dr. Young's retirement in 2007.

The current USDA/ARS/Great Basin Rangelands Research Unit additionally employed Dr. K. A. Snyder, Eco-hydrologist, Dr. M. A. Weltz, Rangeland Management Specialist, and Dr. B. G. Rector, Entomologist. The Great Basin Rangelands Research Unit has produced more than 1,200 publications addressing a variety of ecological issues throughout the Great Basin.

The Great Basin Rangelands Research Unit is directed to conduct research and provide applicable solutions to challenging issues confronting Great Basin rangeland ecosystems. The unit scientists provide management guidelines; develop new technologies, and practices for conserving and rehabilitating Great Basin rangelands, coupled with evaluating the effectiveness of these management actions.

The Great Basin Rangeland Research Unit conducts a lot of research on the rehabilitation of degraded Great Basin rangelands. This site burned in 1991, we seeded the site in 1992 to perennial grasses and antelope bitterbrush. The rehabilitation was slow to start, 1995 (4a) and became another success just years later, 2004 (4b).